



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,694	02/27/2004	Stephen M. Potter	3932	9316

22474 7590 02/27/2006

DOUGHERTY CLEMENTS
1901 ROXBOROUGH ROAD
SUITE 300
CHARLOTTE, NC 28211

EXAMINER

MCNELIS, KATHLEEN A

ART UNIT	PAPER NUMBER
----------	--------------

1742

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/789,694	Applicant(s) POTTER ET AL.	
	Examiner Kathleen A. McNelis	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claims Status

Claims 1-10 remain for examination wherein claims 1, 2, 4, 5, 7 and 9 are amended.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 20 January 2006 has been entered.

Status of Previous Rejections

The previous rejections of claims 1-10 under 35 U.S.C. 103 are withdrawn in view of applicants' remarks and amendments to the claims. Examiner agrees that the temperature range cited in U.S. pat. No. 6,395,056 is likely a typographical error in that patent.

The previous provision double patenting rejection of claims 7 and 8 is withdrawn in view of applicants' cancellation of claims 6 and 7 in copending Application No. 10/789,696.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

Art Unit: 1742

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 1, the amended language "...at a temperature less than 300 °C" is not supported by the specification. On page 8, lines 24-25 (cited by applicant as supportive) it states that the ore is heated "...preferably to at least 300 C". This does not support a limitation of preheating to a temperature of less than 300 °C (claim 1).

Regarding claim 5, the cited supporting statement in the text (p. 4 line 3) is discussing prior art wherein particulate is heated above 600C and does not state that it is the intention of the present invention to limit the temperature to below 600 °C. It is therefore not supportive of the amended language "...less than 600 °C."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meissner et al. (U.S. Pat. No. 5,437,708 in view of PBK Engineering Ltd (1992) and Stephens, Jr. (U.S. Pat. No. 5,810,906).

Meissner et al. discloses a method and apparatus for producing iron carbide in a shaft furnace by reacting reducing gas with iron oxide (abstract). An example is provided wherein lump ore is reduced and carburized to produce iron carbide (col. 8 lines 1-16).

With respect to claims 1 and 3, Meissner et al. does not disclose that the solid lump feed material is stored for a predetermined time in an open atmosphere, or that the feed is dried at a temperature less than 300 °C to a water content of less than about 0.5% prior to reducing.

PBK Engineering Ltd (1992) discloses the results of a preliminary evaluation of the Lodestone Iron Ore Project for producing DRI and/or iron carbide in western Canada and western USA (p. 1-1). The mine operation operates on a 5-day production week whereas the mill operates 7 days per week. The mill therefore includes storage capacity for coarse ore sized for 4 days of operating capacity to ensure sufficient storage for weekend mill operation (p. 6-1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide sufficient stockpile of ore as taught by PBK Engineering Ltd. for the lump ore feedstock of Meissner et al. to provide sufficient capacity for operation between scheduled ore deliveries as taught by PBK Engineering Ltd.

Stephens Jr. discloses a method for preheating an iron oxide feed material prior to converting the material into an iron carbide product wherein the feed is heated and dried under oxidizing conditions, then reduced to ferrous iron in a reducing stage prior to carburization (abstract). Stephens Jr. discloses that the presence of moisture and sulfur retard the conversion of iron oxides to carbides. Stephens Jr. removes or eliminates sulfide sulfur and moisture by preheating in the presence of an oxidizing gas (col. 2 lines 44-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to preheat in an oxidizing environment as taught by Stephens Jr.

Art Unit: 1742

the ore feed for the process of Meissner et al. in view of PBK Engineering Ltd. in order to remove sulfur and moisture which retard formation of iron carbides as taught by Stephens Jr. Stephens Jr. teaches that the feed should be dried to preferably no more than about 0.5% and most preferably to between 0 and 0.1% moisture by weight (col. 3 lines 1-16) which is within claimed range of less than about 0.5% by weight. Stephens Jr. teaches that the temperature range should be from about 300 °C to about 500 °C (col. 6 lines 31-45) which is close to the claimed ranges of less than 300 °C (claim 1). It has been well settled that where claimed ranges and prior art ranges do not overlap but lie close enough that one of ordinary skill in the art would expect the same properties to result, a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

With respect to the range of about 200 °C in claim 3, it would have been obvious to one skilled in the art to reduce the drying temperature from about 300 °C to about 200 °C in Stephens at the cost of increasing the drying time. Furthermore, it is well settled that where the principal between a claimed process and that taught by reference is a temperature difference, it is incumbent upon applicants to establish the criticality of that difference (Ex parte Khusid, et al., 174 USPQ 59).

With respect to claims 4 and 6, Stephens Jr. discloses cyclones and rotary kilns as examples of equipment that may be used for the drying process (col. 5 lines 20-37) and teaches that the oxidizing atmosphere in the preheating system is preferably obtained by combustion of the off gas from the reduction process to recover the unreleased heat from the partially oxidized fuels in the off gas as well as eliminate the toxic carbon monoxide from the off gases (col. 2 lines 1-16). The term "storage bin" in

Art Unit: 1742

claim 4 is sufficiently broad to include the cyclone device or kiln used as examples by Stephens Jr. The process of Meissner et al. has two waste gas streams, the exhaust for the reformer (32) and the spent reduction gas (22) shown on figure 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize for preheating as taught by Stephens Jr. the off gas from either or both of the gas exhausts of Meissner et al. in view of PBK Engineering Ltd. to recover heat and fuel value as taught by Stephens Jr.

With respect to claim 5, the oxidizing gas has a temperature of at least about 600 °C (col. 7 lines 40-44) which is close to the claimed range of less than 600 °C. It has been well settled that where claimed ranges and prior art ranges do not overlap but lie close enough that one of ordinary skill in the art would expect the same properties to result, a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

With respect to claim 9, since neither Meissner et al. nor Stephens Jr. discloses lime coated pellets, one of ordinary skill in the art at the time the invention was made would assume that in the process of Meissner et al. in view of PBK Engineering Ltd. and Stephens Jr., the dried iron ore lump feed is charged separately from any lime coated pellet feed material.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meissner et al. (U.S. Pat. No. 5,437,708 in view of PBK Engineering Ltd (1992) and Stephens, Jr. (U.S. Pat. No. 5,810,906) as applied to claim 1 and further in view of Stoughton (1908).

Meissner et al. in view of PBK Engineering Ltd and Stephens Jr. discloses a method and apparatus for producing iron carbide in a shaft furnace by reducing lump

ore. Sufficient ore is stored to provide operating capacity for ore processing between scheduled deliveries of supply as discussed above regarding claim 1.

Meissner et al. in view of PBK Engineering Ltd and Stephens Jr. does not disclose stockpiling ore for at least one month.

Stoughton discloses a method of ore transportation and handling (pp. 19-22), wherein the importance of providing uninterrupted feed to the furnace (p. 22) and the shipping of ore through channels that are closed during winter icing (p. 20) are taught. The capacity of the stockpile is a therefore result effective variable depending upon the schedule, distance and uncertainty in transportation and supply of ore (see M.P.E.P. 2144.05, II, B). It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the size of the stockpile of lump ore as taught by PBK Engineering Ltd. for the lump ore feedstock of Meissner et al., to provide sufficient capacity for operation of the furnace and ensure against disruptions in ore transportation and supply as taught by Stoughton.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Villarreal-Trevino et al. (U.S. Pat. No. 6,395,056) in view of Meissner et al. (U.S. Pat. No. 5,437,708).

Claim 7 contains the following means plus function limitations that are not defined structurally in the specification and have therefore been given the broadest interpretation (see M.P.E.P 2181):

- Means for removing hot gas from the furnace,
- Reformer means for reforming the removed off-gas,
- including means for heating the reformer by combustion of gas,

- means for removing waste combusted off-gas from the reformer,
- means for removing waste off gas communicating with said storage bin, and
- means for transporting the heated feed material to the furnace and for charging the heated feed material into the furnace.

Villarreal-Trevino et al. discloses an apparatus for preheating feed material to a direct reduction shaft furnace (abstract). On Figure 5, Villarreal-Trevino et al. discloses a moving bed reactor (col. 2 lines 48-51) which is equivalent to the claimed "shaft furnace" having an "upper feeding and heating portion" (12), a "middle gas feeding and reducing portion" (32), "and a lower product discharge portion" (34 and 50). Means is provided "for removing hot gas from the furnace" (42), and for "reforming removed off-gas" (69). A "feed material storage bin" (12) is provided, with means for "removing waste off-gas communicating with said storage bin for heating the contents thereof" (24) and "means of transporting the heated feed material to the furnace and for charging the heated feed material into the shaft furnace for reduction" (26); the feed material storage bin is depicted as a hopper (12; col. 4, lines 23-24).

Villarreal-Trevino et al. does not teach that the contents of the storage bin are heated at 300 °C and dried to less than about 0.5% moisture. However, the manner of operating a device does not differentiate an apparatus from the prior art. "[A]pparatus claims cover what a device *is*, not what a device *does*" (M.P.E.P. 2114). The preheater disclosed by Villarreal-Trevino et al. is capable of heating the contents to a temperature of less than 300 °C and drying the contents to less than about 0.5% by weight moisture, and therefore meets this claim limitation.

Villarreal-Trevino et al. does not specifically teach a means for heating the reformer by the combustion of gas, but this feature is conventional as evidenced by Meissner et al. and discussed above regarding claim 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a combustion heated reformer as disclosed by Meissner et al. in the process of Villarreal-Trevino et al. to recover fuel values from recycled gases as taught by Meissner et al. (col. 5 lines 3-26). Villarreal-Trevino et al. discloses that the heating gas (14) for preheating (12) is a combustion gas provided by combusting a suitable fuel with air in combustion chamber (16; col. 4 lines 19-34). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the exhaust combustion gas from the reformer of Meissner et al. in the preheating chamber of Villarreal-Trevino et al. as it provides a source of combustion gas provided by combusting a suitable fuel with air in a combustion chamber as disclosed by Villarreal-Trevino et al. (col. 4 lines 19-34).

Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Villarreal-Trevino et al. (U.S. Pat. No. 6,395,056) in view of Meissner et al. (U.S. Pat. No. 5,437,708) as applied to claim 7 above, and further in view of Becerra-Novoa et al, (US patent 5,445,363).

Claim 8 and 10 contain the following means plus function limitations that are not defined structurally in the specification and have therefore been given the broadest interpretation (see M.P.E.P 2181):

Claim 8 contains the following means plus function limitations:

- means for transporting the heated feed material to the furnace is insulated

Claim 10 contains the following means plus function limitations:

- means for adjusting the temperature of the waste combusted off-gas

With respect to claim 8, Villarreal-Trevino et al. disclose a shaft furnace, but do not specifically state that the feed storage bin is enclosed or that the means for transporting the heated feed material to the furnace is insulated. Since gas streams are injected into and collected from the feed storage bin (Figure 5, (14) gas inlet and (24) gas outlet), it is implicit that the bin is enclosed. Villarreal-Trevino et al does not disclose that piping 26 is insulated, but this feature is conventional as evidenced by Becerra-Novoa et al which discloses an apparatus for reducing ore comprising piping 38 which is insulated to conserve energy (col. 13, lines 55-60). It would have been obvious to one of ordinary skill in art at the time the invention was made to insulate the Villarreal-Trevino et al piping 26 in view of Beggs et al., in order to conserve energy as disclosed by Becerra-Novoa et al.

With respect to claim 10, Villarreal-Trevino et al. (Figure 5, and col.4 line 20 to column 6 line 16) disclose a heat exchanger (44) and combustion chamber (16) between the means for recovering waste combusted off gas (42) and the feed material storage bin (12). Both the heat exchanger and the combustion chamber provide means for adjusting the temperature of the off-gas.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ROY KING 
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700